NOTE ON THE ACTION OF FROST ON SOIL.

THE action of frost in altering the surface of the soil was well shown during the period of cold weather which prevailed over the Puget Sound region from February 10 to 18, 1903. During this time heavy white frosts formed every night, the temperature falling as low as 24° Fahrenheit, and ice formed three inches thick in open water. In the direct rays of the sun the surface thawed daily, but in shaded places the melting that took place was slight. The ground was not frozen at the beginning of the period mentioned.

The first night's frost had its usual effect of raising the surface of loose ground, which was well illustrated in gravelly soil. A layer of ice consisting of vertical prisms five-eighths of an inch long formed during the night at a depth of about three-eighths of an inch below the surface, thus raising the overlying material without otherwise disturbing it. The cold of the following night produced a similar layer of ice almost an inch thick below the first one, raising the latter along with its load of sand and gravel. A slight thaw took place on the day after the second cold night, the second day of observation. Specimens taken from shady spots early on the following day showed three layers of frost (Figs. 1 and 2), of which the top one had melted down unevenly, being almost destroyed in some places. The larger pebbles, absorbing and radiating a great amount of heat during the day, had settled through the ice to depths varying with their weight and shape.

After six nights the laminated structure presented the appearance shown in Figs. 3 and 4. In some cases the line of division between adjacent layers is difficult to locate in the figure, although it could be found in the specimens. The fifth and sixth nights were not quite so cold as those preceding, and it is to be noted that they yielded crystals of shorter growth, about three-eighths of an inch in length. By the eighth day all the layers

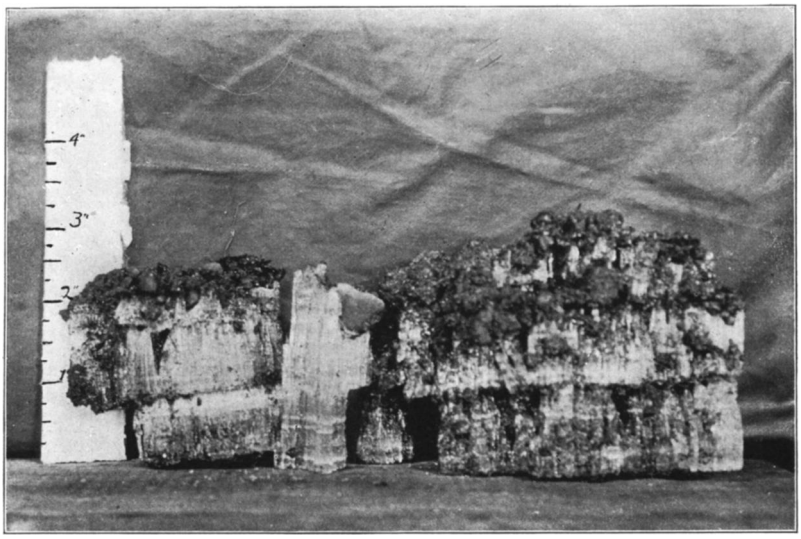

FIG. 1.

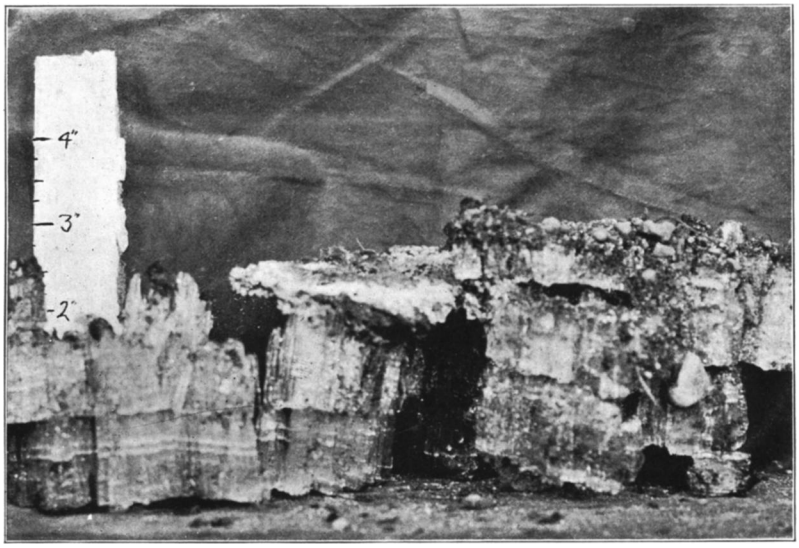

FIG. 2.

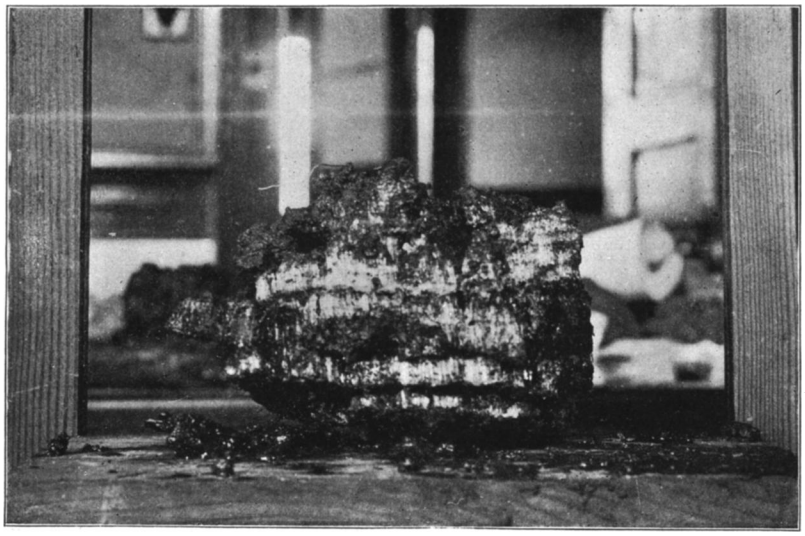

FIG. 3.

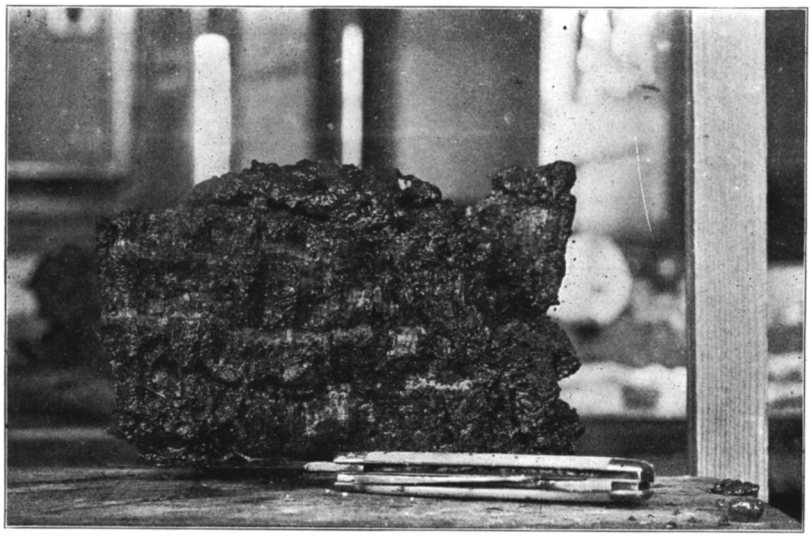

FIG. 4.

had shrunk by melting to such an extent that the total height of the eight layers was less than three inches, and the separate layers could be distinguished only in a few places.

The following conditions prevailed and seem to have controlled the formation of these many-storied frost-forms: (1) ground which was not frozen and which was readily permeable to moisture; (2) freezing temperature at night; (3) mild thawing in the daytime; and (4) considerable moisture in the soil.

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